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CONFIRMATORY SAMPLING INVESTIGATION REPORT ADDENDUM AREA OF CONCERN
726 (AOC 726) ZONE H CNC CHARLESTON SC
01/01/2008
CH2M HILL

CONFIRMATORY SAMPLING REPORT ADDENDUM

AOC 726, Zone H



***Charleston Naval Complex
North Charleston, South Carolina***



SUBMITTED TO
***U.S. Navy Southern Division
Naval Facilities Engineering Command***

PREPARED BY
CH2M-Jones

January 2008

*Revision 0
Contract N62467-99-C-09602*

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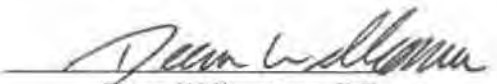
*Revision 0
Contract N62467-99-C-09602
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Certification Page for Confirmatory Sampling Report Addendum (Revision 0) — AOC 726, Zone H, Charleston Naval Complex

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that the qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

South Carolina

Permit No. 21428


Dean Williamson, P.E.


Date



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January 21, 2008

Ms. Stacey French
South Carolina Department of Health and
Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: Confirmatory Sampling Report Addendum, AOC 726, Zone H

Dear Ms. French:

Enclosed please find two copies of the Confirmatory Sampling Report Addendum for AOC 726 in Zone H of the Charleston Naval Complex. This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

Please contact me at 352/335-5877, ext. 52280, if you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Sommer Barker/SCDHEC, w/att
Dann Spariosu/USEPA, w/att
Jeffrey Meyers/Navy, w/att
Gary Foster/CH2M HILL, w/att

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1 **Acronyms and Abbreviations**

2	µg/kg	microgram per kilogram
3	µg/L	microgram per liter
4	1,1-DCE	1,1- dichloroethene
5	AOC	Area of Concern
6	BEQ	benzo(a)pyrene equivalent
7	BRAC	Base Realignment and Closure Act
8	CA	Corrective Action
9	CNC	Charleston Naval Complex
10	COC	chemical of concern
11	COPC	chemical of potential concern
12	CS	Confirmatory Sampling
13	CSWP	Confirmatory Sampling Work Plan
14	DAF	dilution attenuation factor
15	DRO	diesel range organics
16	EPA	U.S. Environmental Protection Agency
17	ft bls	feet below land surface
18	HI	hazard index
19	NA	not available
20	NAVBASE	Naval Base
21	NFA	No Further Action
22	RBC	risk-based concentration
23	RCRA	Resource Conservation and Recovery Act
24	SCDHEC	South Carolina Department of Health and Environmental Control
25	SSL	soil screening level
26	SVOC	semivolatile organic compound
27	VOC	volatile organic compound

SECTION 1.0

Introduction

1.0 Introduction

In 1993, Naval Base (NAVBASE) Charleston was added to the list of bases scheduled for closure as part of the Defense Base Realignment and Closure Act (BRAC), which regulates closure and transition of property to the community. The Charleston Naval Complex (CNC) was formed as a result of the dis-establishment of the Charleston Naval Shipyard and NAVBASE on April 1, 1996.

Corrective Action (CA) activities are being conducted under the Resource Conservation and Recovery Act (RCRA), with the South Carolina Department of Health and Environmental Control (SCDHEC) as the lead agency for CA activities at the CNC. RCRA CA activities are performed in accordance with the Final Permit (Permit No. SC0 170 022 560). In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation and remediation services at the CNC.

1.1 Report Background

On January 9, 2006, SCDHEC issued a letter to the Navy indicating that a new Area of Concern (AOC) had been identified at the CNC. The AOC was described as the location at which workers from Wyatt and Wyatt Construction Company (Wyatt and Wyatt) potentially encountered hazardous constituents while working on a construction project. Subsequent to this letter, the new AOC was designated as AOC 726. The location of AOC 726 at the CNC is shown on **Figure 1-1**. An aerial photo of the site is shown on **Figure 1-2**.

A Confirmatory Sampling Work Plan (CSWP) was prepared to address SCDHEC's request for a work plan to assess whether or not a release of hazardous constituents by the Navy had occurred at AOC 726. The CSWP, which incorporated SCDHEC comments, was approved by the agency on June 8, 2006.

Subsequent to this approval, the CSWP was implemented. A Confirmatory Sampling (CS) Report was prepared and submitted to SCDHEC on September 12, 2006. SCDHEC provided comments on this CS Report to the Navy on October 17, 2006. In these comments and during the discussions regarding them, SCDHEC indicated that because of the detection of diesel range organics (DRO) at several soil sampling locations, the soil should be analyzed for semivolatile organic compounds (SVOCs) to allow for an assessment of potential risks. In addition, SCDHEC requested that additional soil samples from the AOC 726 area be

collected and analyzed for volatile organic compounds (VOCs) due to concerns about the detections of 1,1- dichloroethene (1,1-DCE) in soil at concentrations generally in the range of 1 to 5 micrograms per kilogram ($\mu\text{g}/\text{kg}$), which is above the soil screening level (SSL) of 0.95 $\mu\text{g}/\text{kg}$, at a dilution attenuation factor (DAF) of 1.

An addendum to the CSWP was subsequently prepared to address these additional sampling requests. After review and resolution of SCDHEC comments on the CSWP addendum, the proposed sampling activities were implemented in August 2007. The proposed sampling locations from the CSWP addendum are shown in **Figure 1-3**. At the three previous soil sample locations, the soil sampling approach was to collect soil samples for analysis of SVOCs only. At the new soil sample locations, the soil sampling approach was to collect soil samples for analysis of VOCs only. This addendum to the CS Report presents the results of those sampling activities and provides recommendations for addressing the site.

1.2 Report Addendum Organization

This CS Report Addendum is organized in the following sections:

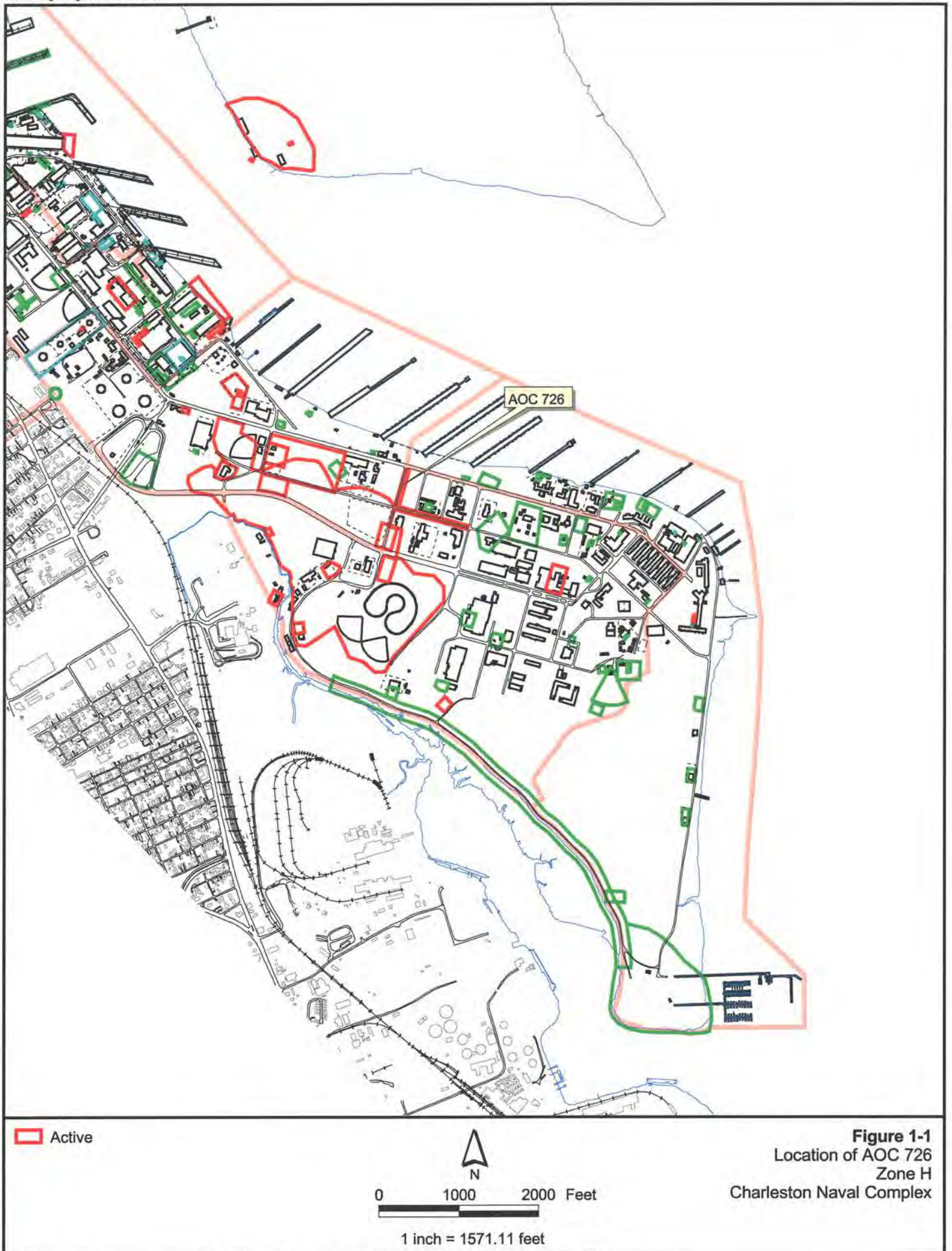
Section 1.0, Introduction provides the background to the report addendum as well as pertinent information regarding the work performed for the preparation of the addendum.

Section 2.0, Field Sampling Results provides a summary of the results drawn from the field sampling effort performed in preparation of the report addendum.

Section 3.0, Conclusions and Recommendations provides a summary of the conclusions developed according the results of the investigation, as well as recommendations for the future.

All tables and figures are presented at the end of their respective sections.

NOTE: Original figure created in color





Active



0 300 600 Feet

1 inch = 339.472 feet

Figure 1-2
Aerial Photo of AOC 726
Zone H
Charleston Naval Complex



SECTION 2.0

Field Sampling Results

2.0 Field Sampling Results

2.1 SVOC Soil Sampling Results

The field and analytical methods used for this CS Report Addendum field effort are the same as those previously described in the original CSWP. The soil sample locations for the report addendum are shown in **Figure 2-1**. At each of the three original soil sampling locations, DRO was detected during the original sampling. As a result, resampling of these locations for analysis of SVOCs was conducted. At each of these locations (726SB004, 726SB005, and 726SB006) a surface (0 to 1 feet below land surface [ft bls]) and subsurface (3 to 5 ft bls) soil sample were collected and analyzed for SVOCs using U.S. Environmental Protection Agency (EPA) Method SW846 8270. The SVOCs detected in surface and subsurface soil samples are summarized in **Tables 2-1** and **2-2**, respectively, along with the appropriate soil chemical of potential concern (COPC) screening criteria used by the CNC Partnering Team.

It can be seen in **Tables 2-1** and **2-2** that no SVOCs in surface or subsurface soil samples exceeded both the COPC screening criteria and background (reference) concentrations. Therefore, no SVOC COPCs or chemicals of concern (COCs) are identified in these samples.

The benzo(a)pyrene equivalent (BEQ) value for each soil sample was also determined using the standard BEQ equivalent toxicity values. These values are presented in **Table 2-3**, along with a comparison against the CNC sitewide reference concentrations for BEQs. It can be seen in **Table 2-3** that none of the BEQ results exceeded the BEQ reference concentrations (1,340 µg/kg for surface soil and 1,400 µg/kg for subsurface soil). Therefore, BEQs are not identified as COCs for this site.

2.2 VOC Soil Sampling Results

Soil samples for VOC analysis were collected at five locations, 726SB007 through 726SB011, as shown in **Figure 2-1**. At each of these five locations, a surface (0 to 1 ft bls) and subsurface (3 to 5 ft bls) soil sample were collected and analyzed for VOCs using EPA Method SW846 8260B. Detected VOCs for surface and subsurface soil samples are summarized in **Tables 2-4** and **2-5**, respectively, along with the appropriate CNC COPC screening criteria.

2.2.1 Surface Soil VOC Results

The purpose of the surface soil VOC sampling was to determine whether 1,1-DCE was present at the site. 1,1-DCE was not detected in any of the five surface soil samples analyzed for VOCs during this investigation. Therefore, 1,1-DCE is not considered a COPC for surface soil at the site.

It can be seen in **Table 2-4** that several VOCs, primarily methylene chloride, were detected in the surface soil samples at concentrations well below the risk-based screening criteria for human exposure to soil, but above the SSL screening value (based on a DAF of 1). However, none of these VOCs were previously detected in the groundwater samples analyzed at the site during the original CSI. Therefore, these chemicals are not considered COPCs for the site. Methylene chloride and acetone are recognized by EPA as common laboratory contaminants.

2.2.2 Subsurface Soil VOC Results

The purpose of the subsurface soil VOC sampling was to determine whether 1,1-DCE was present at the site. 1,1-DCE was not detected in any of the five subsurface soil samples analyzed for VOCs during this investigation. Therefore, 1,1-DCE is not considered a COPC for subsurface soil at the site.

It can be seen in **Table 2-5** that two VOCs, primarily methylene chloride, were detected in the surface soil samples at concentrations well below the risk-based screening criteria for human exposure to soil but above the SSL screening value (based on a DAF of 1). However, neither of these VOCs was previously detected in the groundwater samples analyzed at the site during the original CSI. Therefore, these chemicals are not considered COPCs for the site. Methylene chloride is recognized by EPA as a common laboratory contaminant.

2.2.3 Conclusions for VOC Sampling

The resampling of surface and subsurface soil for VOCs confirmed that 1,1-DCE is not present in site soils. Several VOCs, primarily common laboratory contaminants, were detected in the soil samples. All VOC detections were well below their respective risk-based screening criteria for human exposure to soil. Several VOCs were reported to be present at concentrations above their respective SSLs (based on a DAF of 1). However, because these VOCs have been previously found to be absent from site groundwater, their detection in these soil samples at low levels does not present a risk to the groundwater.

TABLE 2-1
 SVOC Detections In Surface Soil at AOC 726
 CS Report Addendum, AOC 726, Zone H, Charleston Naval Complex

Chemical	Sampling Location	Station ID	Result (µg/kg)	Qualifier	EPA Region III RBC		SSL (DAF=10)	Background (Reference Value)
					Residential (HI=0.1)	Industrial (HI=0.1)		
Di-n-butyl Phthalate	H726SB004	726SB00401	61.9	J	7,800,000	20,000,000	2,500	NA
Di-n-butyl Phthalate	H726SB005	726SB00501	65.9	J	7,800,000	20,000,000	2,500	NA
Acenaphthene	H726SB006	726SB00601	27.8	J	470,000	1,200,000	52,000	NA
Anthracene	H726SB006	726SB00601	52.6	=	2,300,000	61,000,000	230,000	NA
Benzo(a)Anthracene	H726SB006	726SB00601	330	=	87	780	730	838
Benzo(a)Pyrene	H726SB006	726SB00601	316	=	8.7	78	190	874
Benzo(b)Fluoranthene	H726SB006	726SB00601	454	=	8.7	78	190	874
Benzo(g,h,i)Perylene	H726SB006	726SB00601	149	=	NA	NA	NA	NA
Carbazole	H726SB006	726SB00601	23.7	J	3,200	29,000	230	NA
Chrysene	H726SB006	726SB00601	327	=	8,700	78,000	73,000	844
Di-n-butyl Phthalate	H726SB006	726SB00601	47.5	J	7,800,000	20,000,000	2,500	NA
Fluorene	H726SB006	726SB00601	11.5	J	310,000	8,200,000	68,000	NA
Fluoranthene	H726SB006	726SB00601	559	=	310,000	8,200,000	3,100	NA
Indeno(1,2,3-c,d)pyrene	H726SB006	726SB00601	150	=	87	780	6,400	874
2-Methylnaphthalene	H726SB006	726SB00601	11.1	J	160,000	4,100,000	11,000	NA
Phenanthrene	H726SB006	726SB00601	250	=	NA	NA	NA	NA
Pyrene	H726SB006	726SB00601	607	=	210,000	6,100,000	340,000	NA

TABLE 2-1
 SVOC Detections In Surface Soil at AOC 726
CS Report Addendum, AOC 726, Zone H, Charleston Naval Complex

Chemical	Sampling Location	Station ID	Result (µg/kg)	Qualifier	EPA Region III RBC		SSL (DAF=10)	Background (Reference Value)
					Residential (HI=0.1)	Industrial (HI=0.1)		

Notes:

All values are presented in units of micrograms per kilogram (µg/kg).

DAF = dilution attenuation factor

EPA = U.S. Environmental Protection Agency

HI = hazard index

NA = No value is available.

RBC = risk-based concentration

SSL = soil screening level

Data qualifiers:

[=] Detected. The analyte was analyzed for and detected at the concentration shown.

[J] Estimated. The analyte was present but the reported value may not be accurate or precise.

TABLE 2-2
 SVOC Detections In Subsurface Soil at AOC 726
 CS Report Addendum, AOC 726, Zone H, Charleston Naval Complex

Chemical	Sampling Location	Station ID	Result	Qualifier	SSL (DAF=10)	Background (Reference Value)
Di-n-butyl Phthalate	H726SB004	726SB00402	72.7	J	2,500	NA
Benzo(a)Pyrene	H726SB005	726SB00502	99.7	=	190	496
Di-n-butyl Phthalate	H726SB005	726SB00502	62.8	J	2,500	NA
Fluoranthene	H726SB005	726SB00502	15.9	J	3,100	NA
Benzo(a)Pyrene	H726SB006	726SB00602	94.2	J	190	496
Benzo(b)Fluoranthene	H726SB006	726SB00602	18.7	J	190	498
Di-n-butyl Phthalate	H726SB006	726SB00602	42.6	J	2,500	NA
Fluoranthene	H726SB006	726SB00602	11.9	J	3,100	NA

Notes:

All values are presented in units of micrograms per kilogram (µg/kg).

DAF = dilution attenuation factor

NA = No value is available.

SSL = soil screening level

Data qualifiers:

[=] Detected. The analyte was analyzed for and detected at the concentration shown.

[J] Estimated. The analyte was present but the reported value may not be accurate or precise.

TABLE 2-3
 Calculation of BEQs for Soil Samples at AOC 726

			H726SB004				H726SB005				H726SB006			
	Units	TEF	Surface	726SB00401	Subsurface	726SB00402	Surface	726SB00501	Subsurface	726SB00502	Surface	726SB00601	Subsurface	726SB00602
PAHs														
Benzo(a)anthracene	mg/Kg	0.1	38.1 U	1.9050000	41.5 U	2.0750000	38.80000 U	1.9400000	41.7 U	2.0850000	330 =	33.0000000	38 J	3.8000000
Benzo(b)fluoranthene	mg/Kg	0.1	38.1 U	1.9050000	41.5 U	2.0750000	38.80000 U	1.9400000	41.7 U	2.0850000	454 =	45.4000000	18.7 J	1.8700000
Benzo(k)fluoranthene	mg/Kg	0.01	38.1 U	0.1905000	41.5 U	0.2075000	38.80000 U	0.1940000	41.7 U	0.2085000	34.8 U	0.1740000	38 U	0.1900000
Benzo(a)pyrene	mg/Kg	1	38.1 U	19.0500000	41.5 U	20.7500000	38.80000 U	19.4000000	99.7 =	99.7000000	316 =	316.0000000	94.2 J	94.2000000
Chrysene	mg/Kg	0.001	38.1 U	0.0190500	41.5 U	0.0207500	38.80000 U	0.0194000	41.7 U	0.0208500	327 =	0.3270000	38 U	0.0190000
Dibenz(a,h)anthracene	mg/Kg	1	38.1 U	19.0500000	41.5 U	20.7500000	38.80000 U	19.4000000	41.7 U	20.8500000	34.8 U	17.4000000	38 U	19.0000000
Ideno(1,2,3-c,d)pyrene	mg/Kg	0.1	38.1 U	1.9050000	41.5 U	2.0750000	38.80000 U	1.9400000	41.7 U	2.0850000	150 =	15.0000000	38 U	1.9000000
Benzo(a)pyrene Equivalent (BEQ) concentration (ug/Kg) =			44.0		48.0		44.8		127.0		427.3		121.0	

Fraction of "U" data = 0.5
 (used in calculation)

TABLE 2-4
 VOC Detections In Surface Soil at AOC 726
CS Report Addendum, AOC 726, Zone H, Charleston Naval Complex

Chemical	Sampling Location	Station ID	Result	Qualifier	EPA Region III RBC		
					Residential (HI = 0.1)	Industrial (HI = 0.1)	SSL (DAF=1)
1,4-Dichlorobenzene	H726SB007	726SB00701	0.469	J	2,700	24,000	0.36
Methylene Chloride	H726SB007	726SB00701	5.31	=	8,500	76,000	1
Methylene Chloride	H726SB008	726SB00801	7.8	=	8,500	76,000	1
Methylene Chloride	H726SB009	726SB00901	5.88	=	8,500	76,000	1
Methylene Chloride	H726SB010	726SB01001	2.99	J	8,500	76,000	1
Acetone	H726SB011	726SB01101	10.6	=	780,000	20,000,000	800
Methylene Chloride	H726SB011	726SB01101	7.53	=	8,500	76,000	1

Notes:

All values are presented in units of micrograms per liter (µg/L).
 Exceedances of screening criteria are shown in bold text.

DAF = dilution attenuation factor
 SSL = soil screening level

Data qualifiers:

[=] Detected. The analyte was analyzed for and detected at the concentration shown.
 [J] Estimated. The analyte was present but the reported value may not be accurate or precise.

TABLE 2-5
 VOC Detections In Subsurface Soil at AOC 726
CS Report Addendum, AOC 726, Zone H, Charleston Naval Complex

Chemical	Sampling Location	Sample ID	Result	Qualifier	SSL (DAF=1)
1,4-Dichlorobenzene	H726SB007	726SB00702	0.742	J	0.36
Methylene Chloride	H726SB007	726SB00702	10.4	=	1
Xylenes, Total	H726SB007	726SB00702	0.334	J	10,000
m+p Xylene	H726SB007	726SB00702	0.334	J	10,000
Acetone	H726SB008	726SB00802	4.25	J	800
Methylene Chloride	H726SB008	726SB00802	9.5	=	1
Acetone	H726SB009	726SB00902	36.2	=	800
1,4-Dichlorobenzene	H726SB009	726SB00902	0.344	J	0.36
Methyl ethyl ketone (2-Butanone)	H726SB009	726SB00902	4.66	J	400
Methylene Chloride	H726SB009	726SB00902	6.29	=	1
Methylene Chloride	H726SB010	726SB01002	6.06	=	1
Acetone	H726SB011	726SB01102	38.3	=	800
Methyl ethyl ketone (2-Butanone)	H726SB011	726SB01102	6.62	J	400
Methylene Chloride	H726SB011	726SB01102	8.02	=	1

Notes:

All values are presented in units of micrograms per liter (µg/L).
 Exceedances of screening criteria are shown in bold text.

DAF = dilution attenuation factor
 SSL = soil screening level

Data qualifiers:

[=] Detected. The analyte was analyzed for and detected at the concentration shown.
 [J] Estimated. The analyte was present but the reported value may not be accurate or precise.



Figure 2-1
Soil Sample Locations
AOC 726
Charleston Naval Complex

SECTION 3.0

Conclusions and Recommendations

1 **3.0 Conclusions and Recommendations**

2 The additional sampling and analysis at AOC 726 confirmed that the SVOCs do not pose an
3 unacceptable risk to human health and the environment, and that 1,1-DCE is not present
4 across the site. No SVOC or VOC COCs are identified for AOC 726. Overall, the data
5 indicate that additional sampling and analysis is not required. The site is recommended for
6 No Further Action (NFA).